Introduction to Enterprise Objects Framework

Session 703

Introduction to Enterprise Objects Framework

James Dempsey
Operations Engineer
Apple Software Customer Seeding

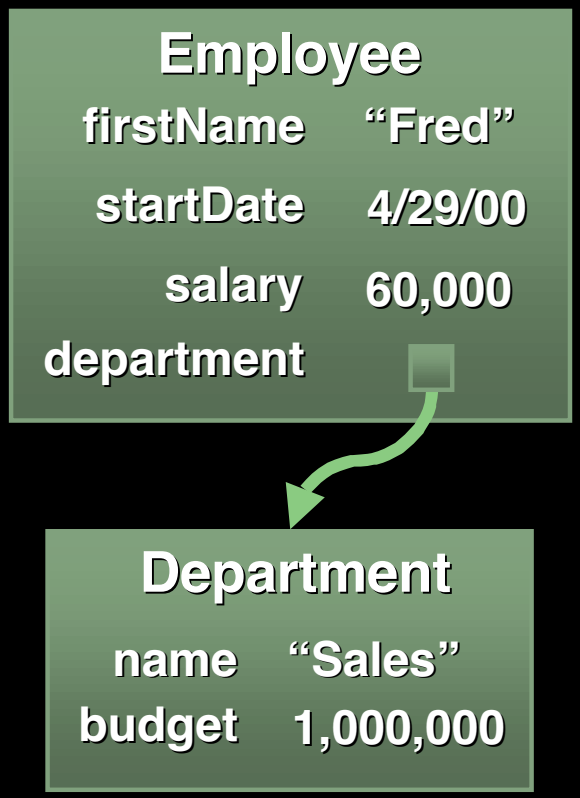
What You'll Learn

- An overview of the purpose and benefits of EOF
- Introduction to basic database operations
- Working with persistent objects
- Demonstration of desktop EOF applications
- A conceptual model of how EOF works

Technology Framework

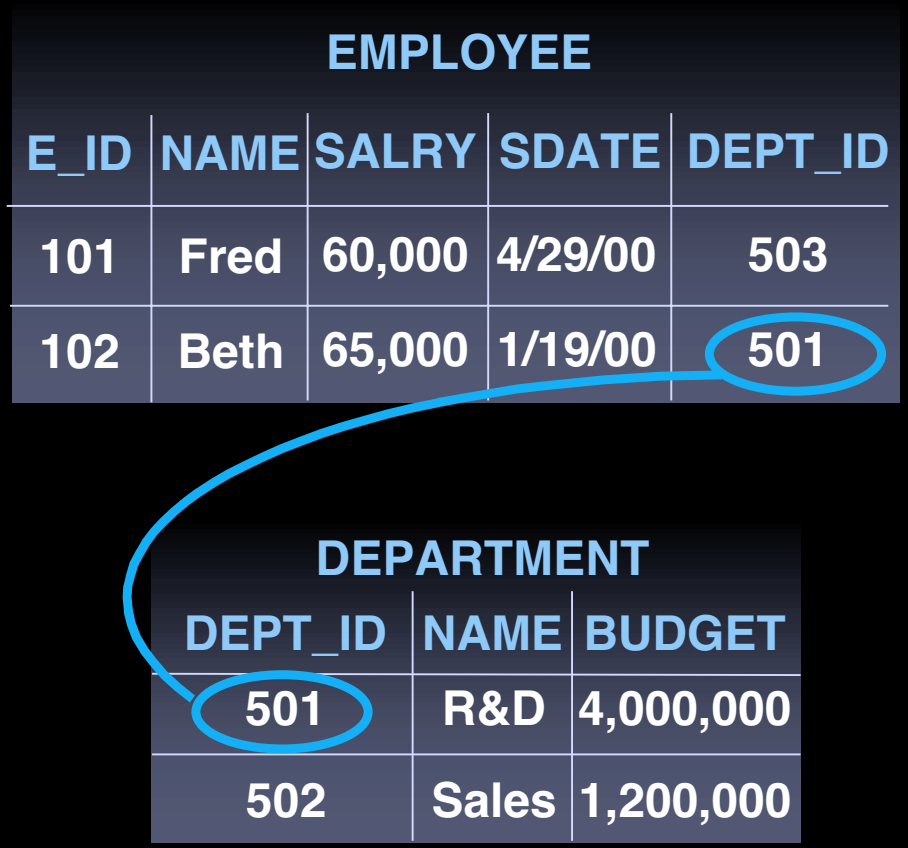
- An introduction to the EOAccess and EOControl frameworks of EOF
- These frameworks form the core of database access in
    - HTML and XML-based WebObjects applications
    - Cocoa EOF applications
    - Java Client applications

Object-Oriented Applications



- Different classes of objects to model different types
- Each object stores data
- Each class of object has behavior—business logic
- How does object state persist between uses?

Database-Driven Applications



- Different tables model different types of data
- Each row stores data
- Database can execute stored procedures
- How to use the data in an object-oriented manner?

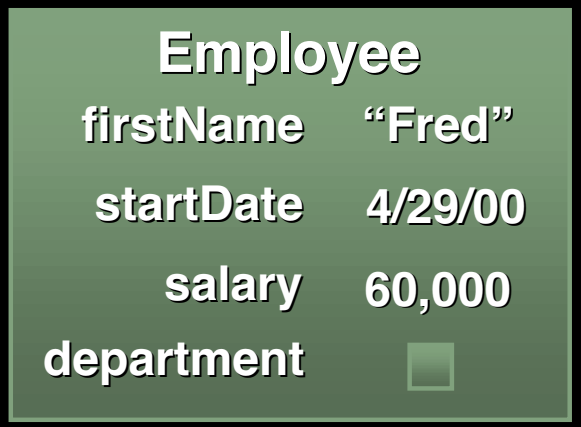
Enterprise Objects Framework

An object-relational persistence layer

- Uses the natural mapping between objects and relational databases
- Abstracts business logic and database operations
- Preserves object-oriented nature of persistent objects
- Sophisticated, mature, object-oriented architecture

Enterprise Objects

Affectionately known as EOs



- Implement the EOEnterpriseObject interface
- Objects with built-in persistence

Entities and Attributes

Employee	
firstName	“Fred”
startDate	4/29/00
salary	60,000
department	

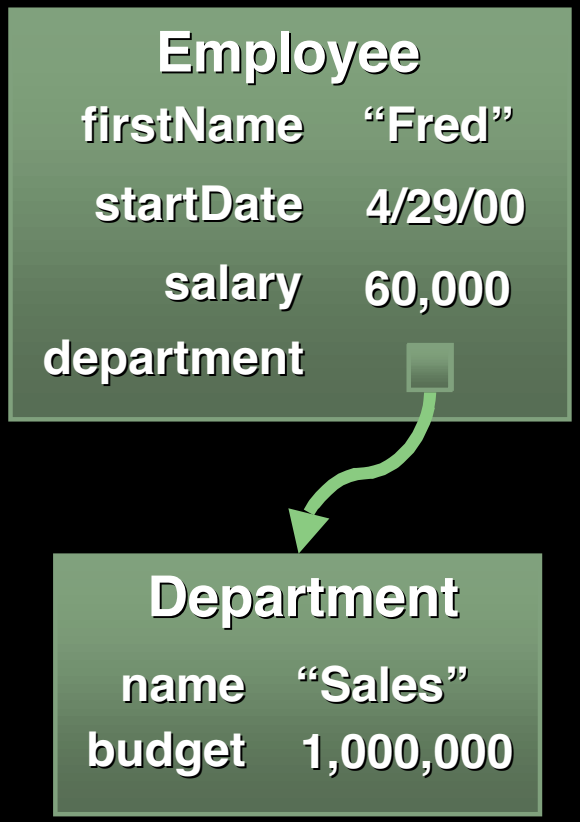
Employee	
firstName	“Beth”
startDate	1/19/00
salary	65,000
department	

EMPLOYEE

EMP_ID	NAME	SALARY	ST_DATE	DEPT_ID
101	Fred	60,000	4/29/00	503
102	Beth	65,000	1/19/00	501

Relationship by Reference

A unique reference to another object



Relationship by Join

A unique primary key value in another table

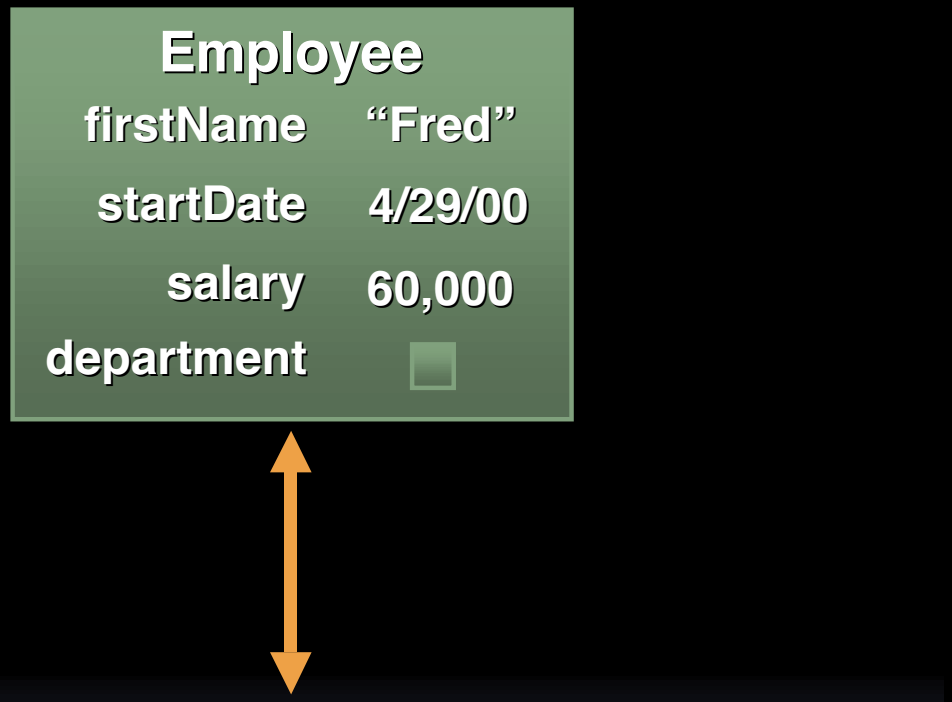
EMPLOYEE

EMP_ID	NAME	SALARY	ST_DATE	DEPT_ID
101	Fred	60,000	4/29/00	503
102	Beth	65,000	1/19/00	501

DEPARTMENT

DEPT_ID	NAME	BUDGET
501	R&D	4,000,000
502	Sales	1,200,000

From Row to EO and Back

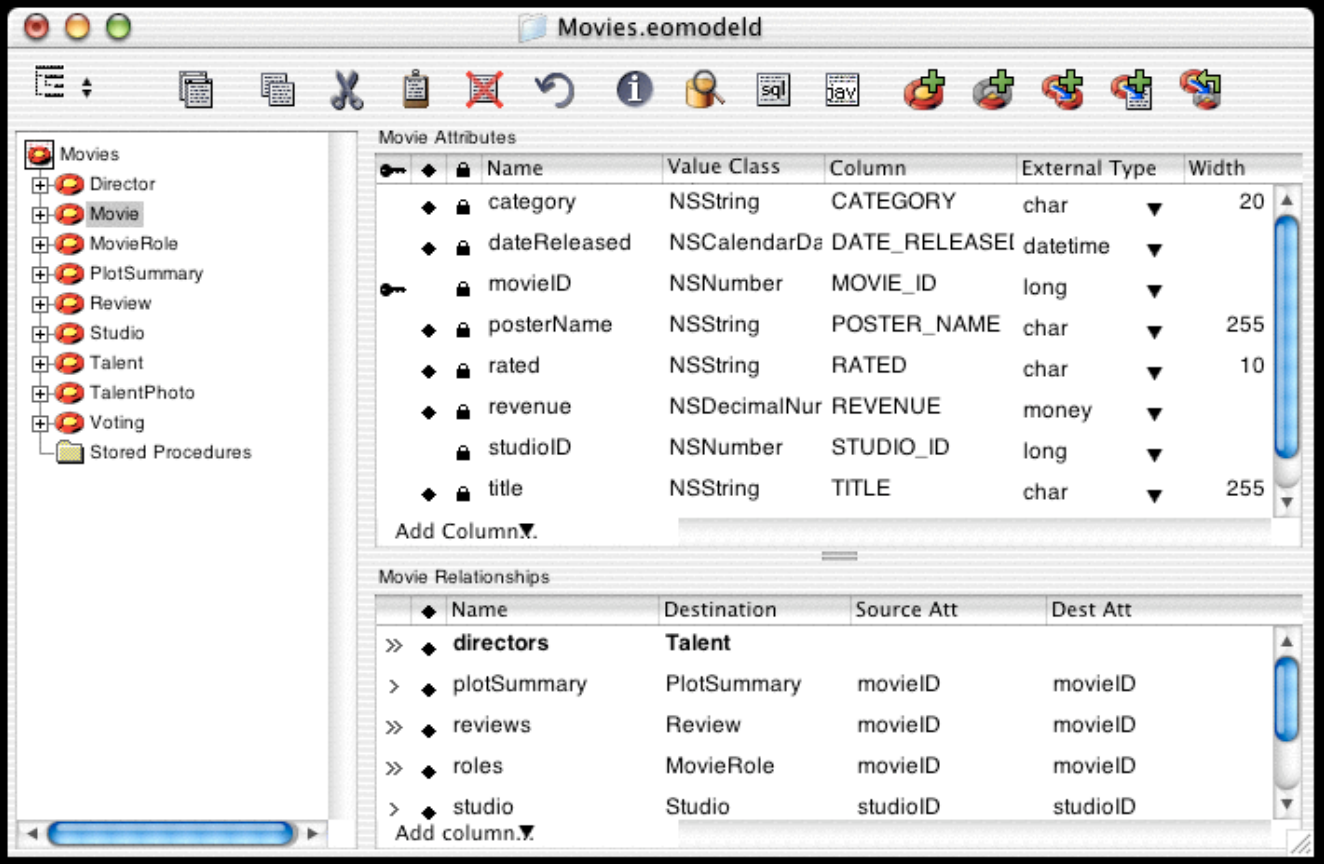


EMPLOYEE

EMP_ID	NAME	SALARY	ST_DATE	DEPT_ID
101	Fred	60,000	4/29/00	503

Model Defines the Mapping

Define object-relational mapping in EOModeler



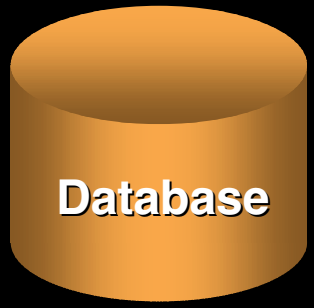
Multiple Views, Same Data

EOF-based Application

EOF-based Application

EOF-based Application

EOF-based Application



Logic Written in Standard Java

Object-oriented design in a widely used language

EOF-based Application

EOF-based Application

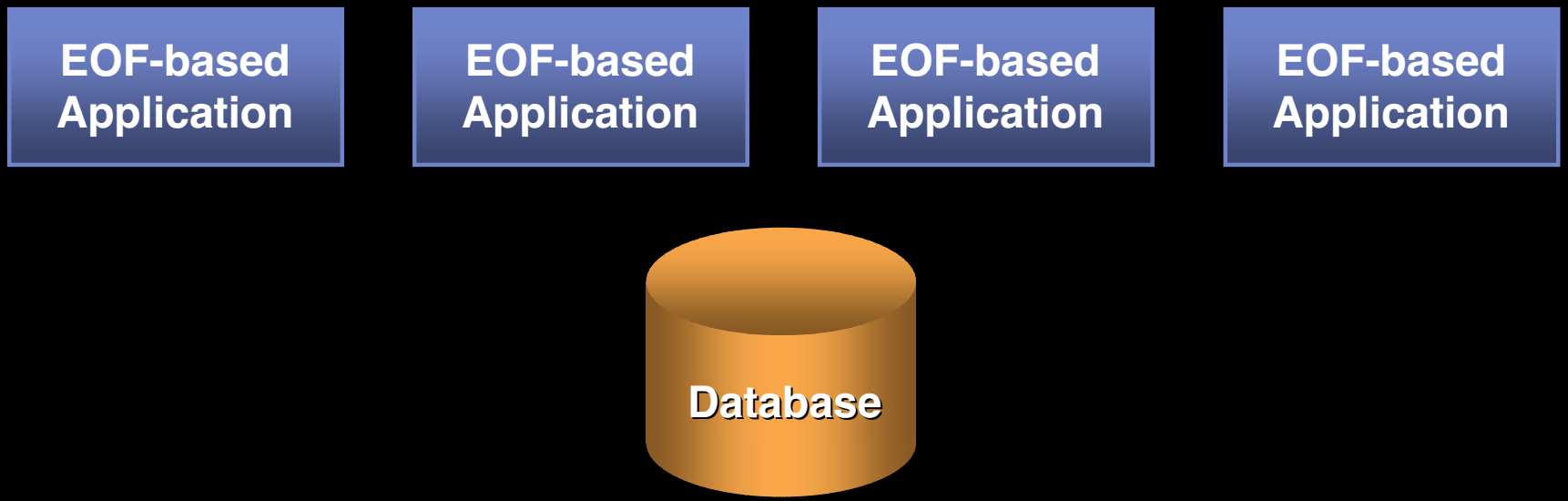
EOF-based Application

EOF-based Application

Database

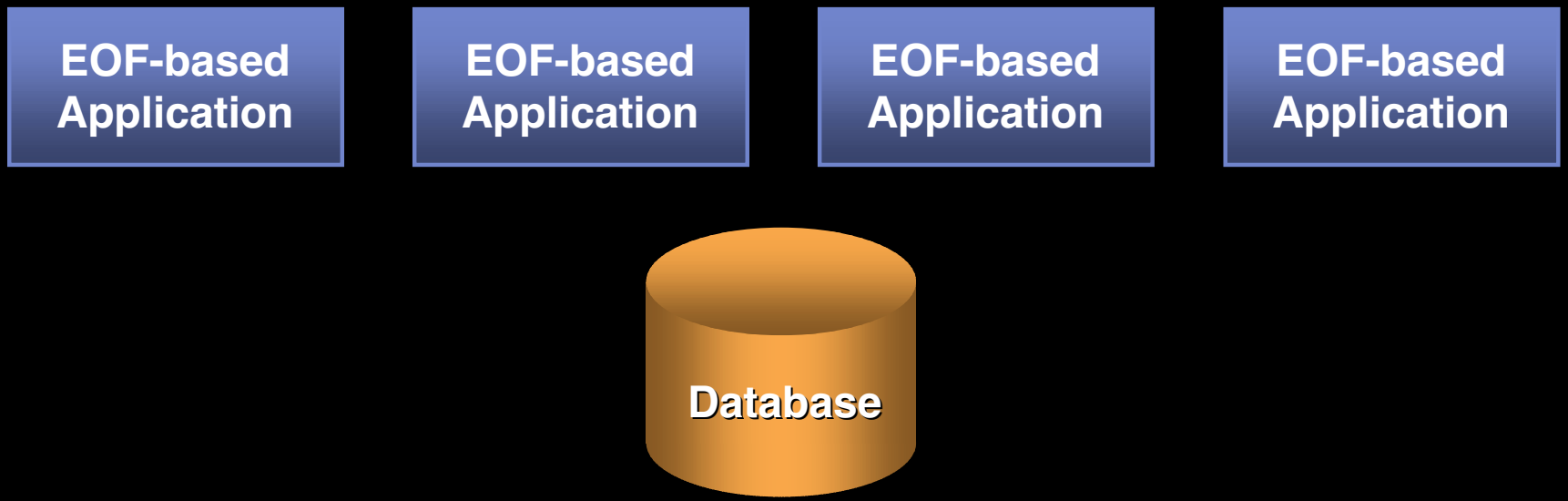
Distributed Processing

Off-load logic processing to applications



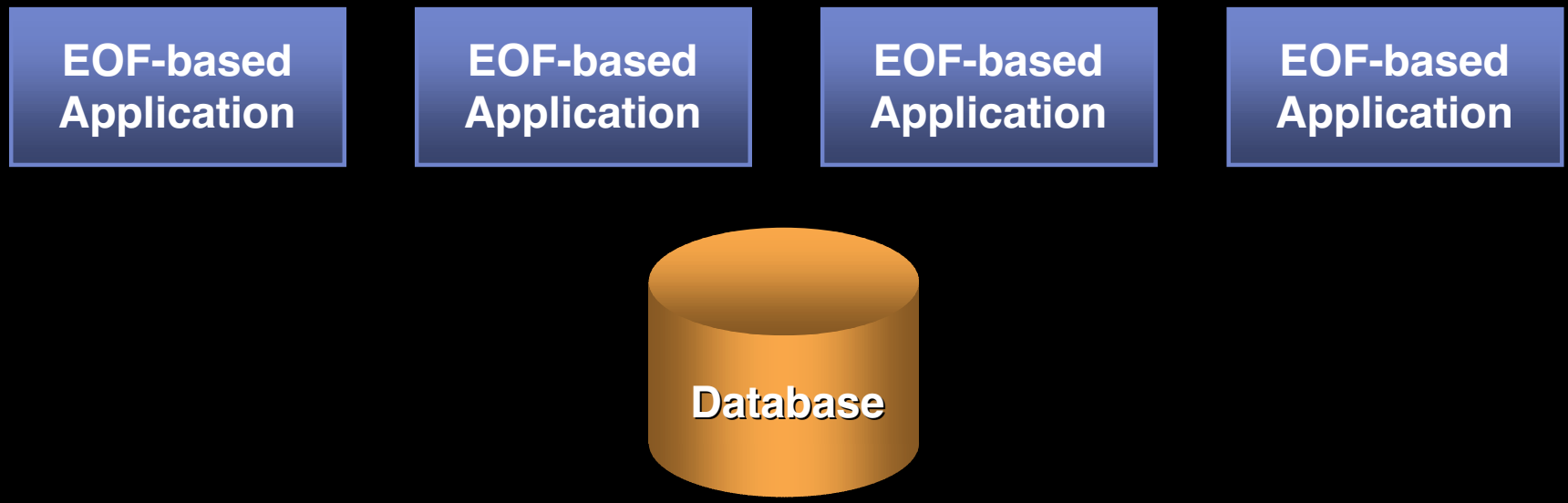
Dynamically Generated SQL

Transactions and statements generated by EOF



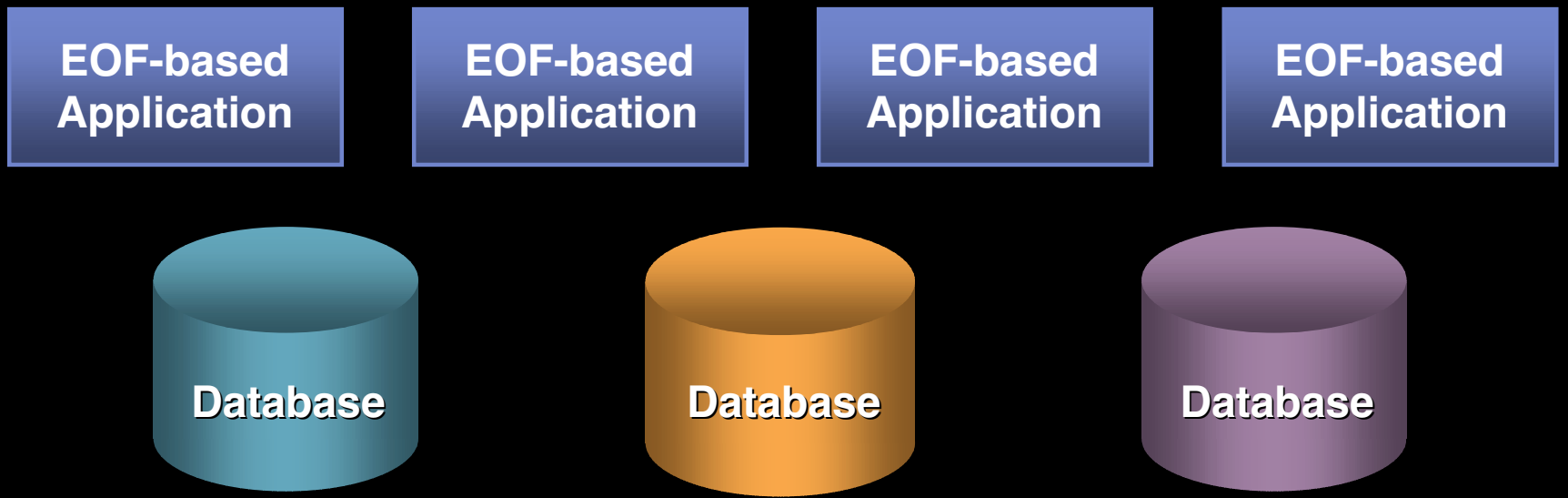
Access to Database Features

Can access stored procedures and execute custom SQL from within EOF as needed



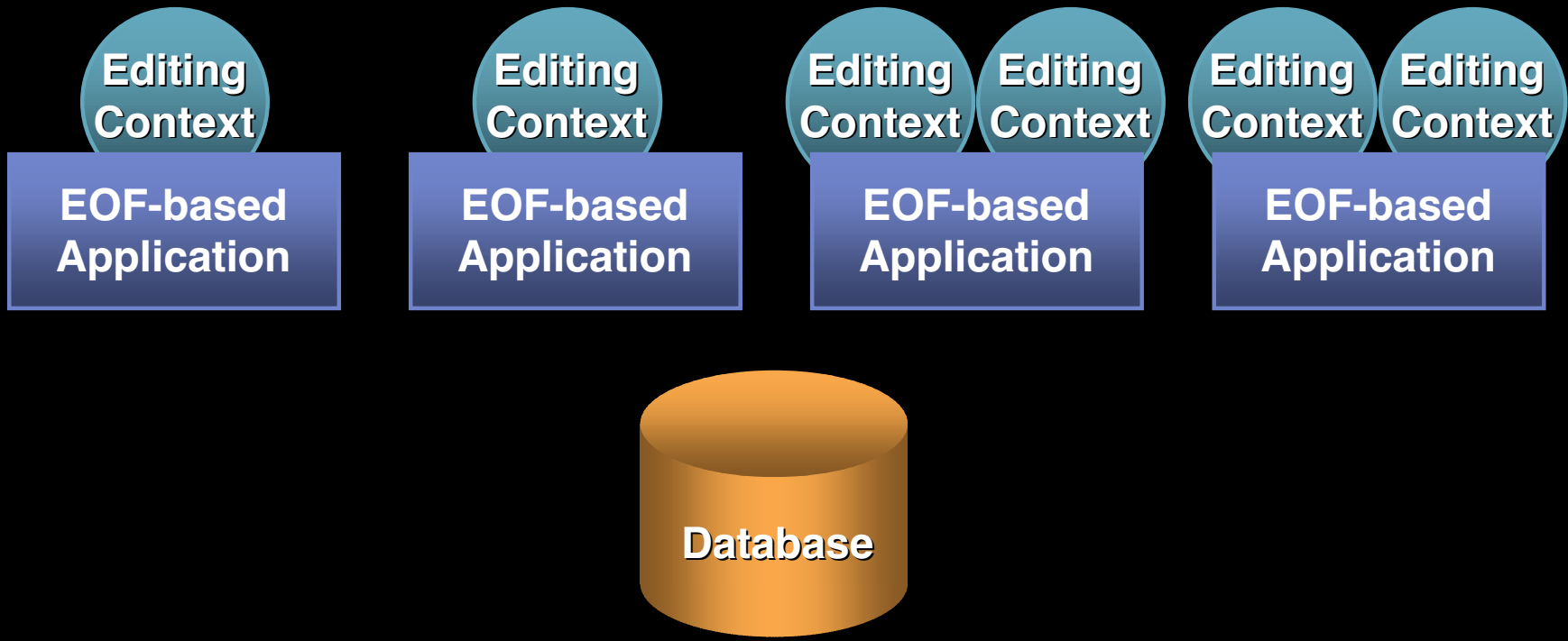
Multiple Data Sources

Using data from different sources abstracted at a low level—programmatic interface remains the same



Separate ‘Scratch Pad’ Per User

Each user provided a separate context for making edits and canceling changes



Basic EOF Operations

- Fetch
- Insert
- Update
- Delete
- Save
- Revert

EOEditingContext

The class you use most for programmatic control

- Fetches from the database
- Observes updates to all EOs it has fetched
- Tracks inserts and deletes
- Keeps changes until they are saved or reverted

Getting an Editing Context

- Every session in a WebObjects application has a default editing context

```
EOEditingContext ec =
    session().defaultEditingContext();
```

- Editing context for desktop apps lives in nib file
- You can create your own as well

```
EOEditingContext ec =
    new EOEditingContext();
```

Locking the Editing Context

For use with multi-threaded applications

- Default editing context is automatically locked and unlocked in WebObjects applications
- Nib-based editing contexts not locked by default
- Lock and unlock editing contexts that you create before and after use

```
ec.lock();
    // use editing context
ec.unlock();
```

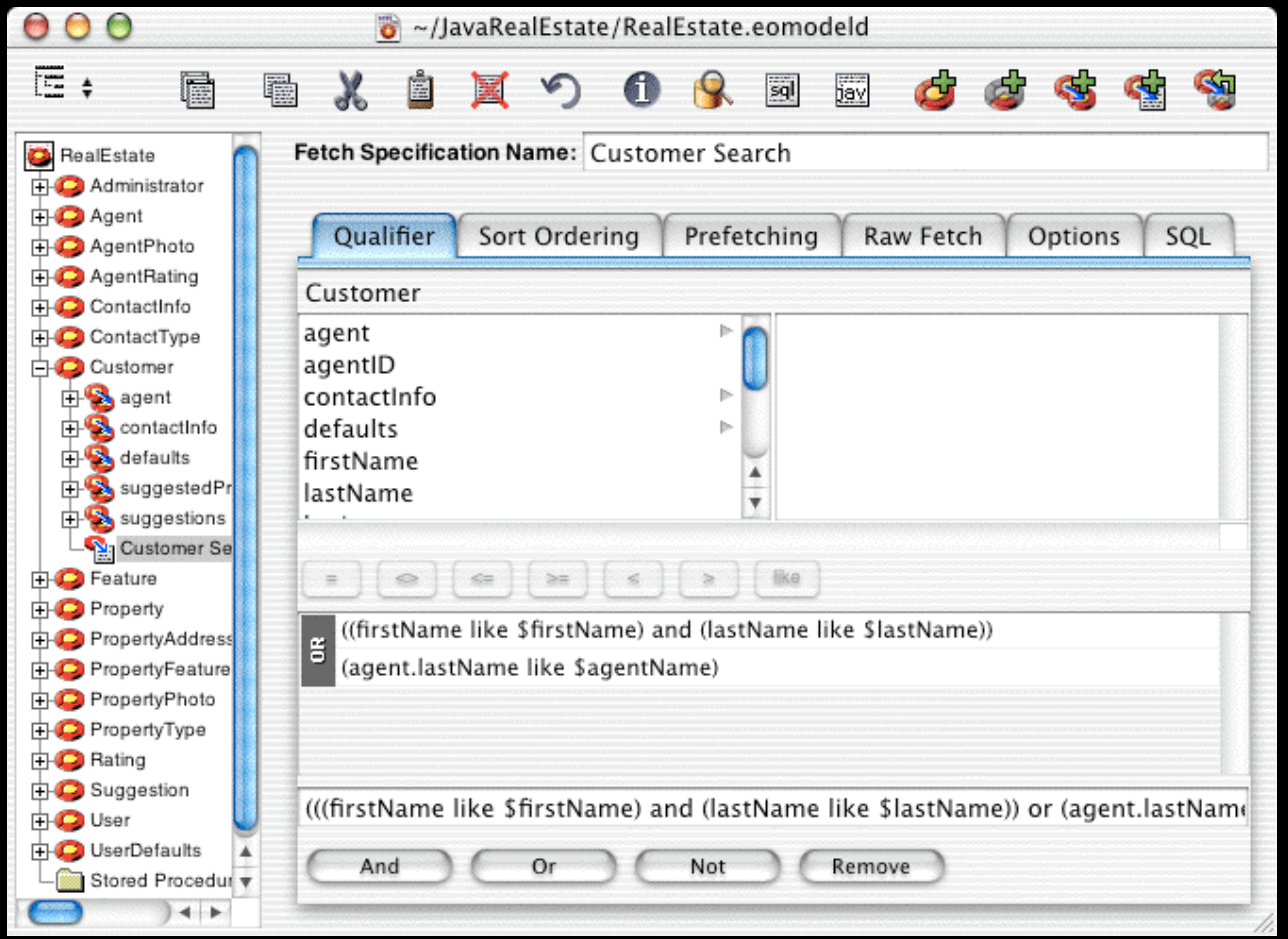
Fetching

Many techniques—all with same underlying steps

- Create a fetch specification
- Access an editing context
- Tell editing context to fetch using the specification
- Receive an array of retrieved Enterprise Objects

Graphical Fetch Builder

Define fetch graphically in EOModeler



Performing the Fetch

- Fetching returns an array of EOs

```
EOFetchSpecification spec;
NSDictionary bindings;
NSArray results;

EOEditingContext ec =
    session().defaultEditingContext();

results =
    EOUtilities.
        objectsWithFetchSpecificationAndBindings
            (ec, “Customer”, “FetchSpec”, bindings);
```

Creating and Inserting

- Two separate steps combined in one convenience method

```
EOEnterpriseObject eo;
EOEditingContext ec;

eo =
    EOUtilities.createAndInsertInstance
            (ec, “Employee”);
```

Deleting

- Tell the editing context to delete the object;
  It will be deleted next time changes are saved

```
EOEnterpriseObject eo;
EOEditingContext ec;

ec.deleteObject(eo);
```

Editing

- Make changes using standard accessors—the editing context observes all changes

```
Employee employee;
employee.setName(“Jerry Long”);
```

- Key Value Coding provides generic accessors

```
employee.takeValueForKey(“Jerry Long”, “name”);
employee.valueForKey(“name”);
```

Saving and Reverting Changes

- Pending changes are not sent to the database until you tell editing context to save changes

```
editingContext.saveChanges();
```

- Pending changes are discarded by telling the editing context to revert

```
editingContext.revert();
```

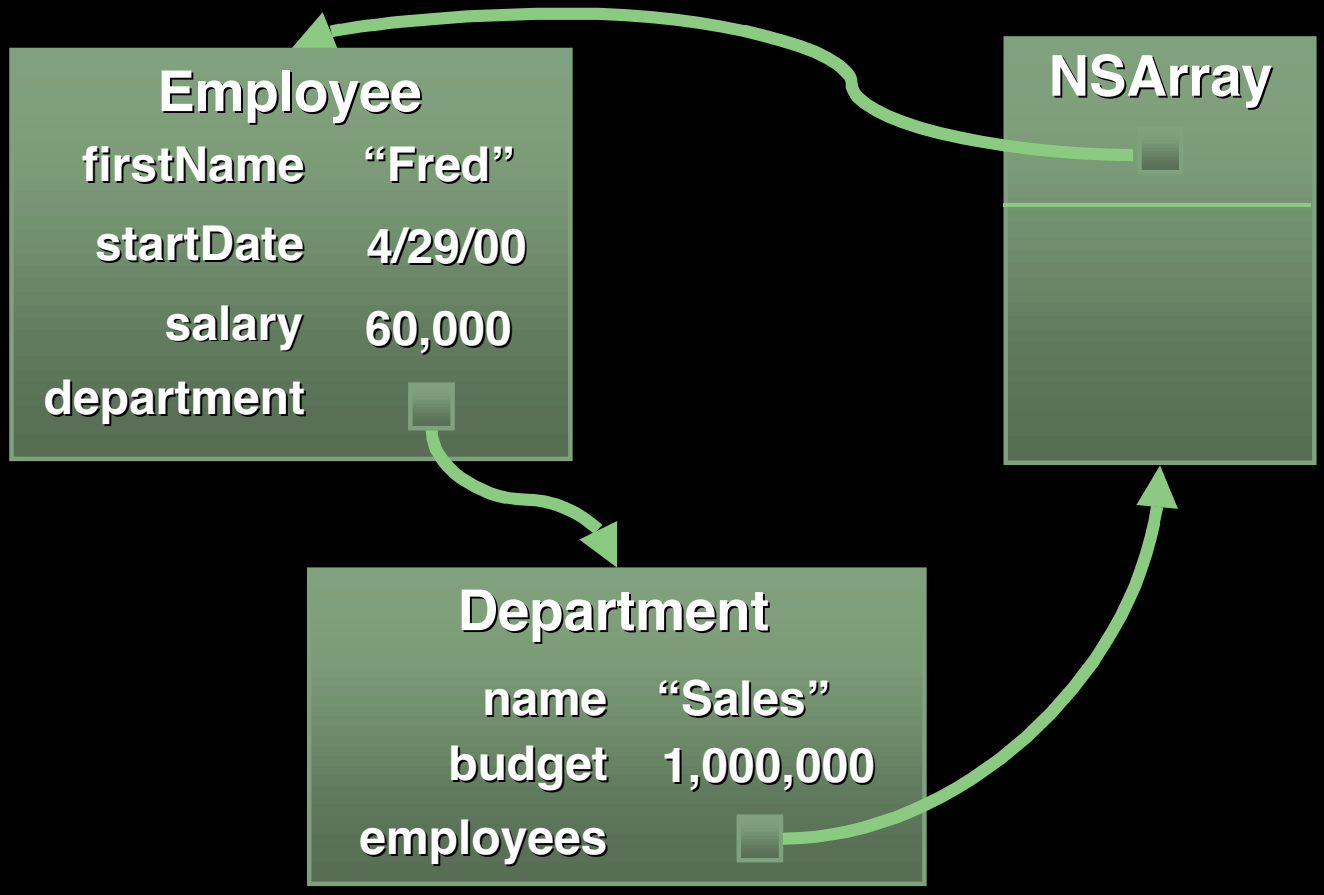
Demo

Genevieve Purugganan
WebObjects Engineering

Using EOs as Objects

- Subclass EOGenericRecord and add class-specific business logic and validation logic
- Call methods, put ‘em in collections, hook ‘em up to user interface elements
- Think about them as objects, and leave the database concepts in the database
- Example: Relationships

An Example Relationship



An Example


Project
employee
Employee
email
EmailAddress
address “bob@b.com

Some SQL

```
SELECT t0.Comments, t0.CreatedBy,
t0.CreatedByMethod, t0.CreationDate, t0.ID,
t0.PortalInvitationText, t0.ModificationDate,
t0.ModifiedBy, t0.ModifiedByMethod,
t0.PrimarySeedEngineer, t0.ProjectDescription,
t0.ProjectInternalName, t0.ProjectName, t0.Status
FROM Projects t0 WHERE t0.Status = "Active"
```

Some SQL

```
SELECT t0.ParticipantProjectMailingAddressID,
t0.Comments, t0.CreatedBy, t0.CreatedByMethod,
t0.CreationDate, t0.DefaultConfigurationID,
t0.ParticipantProjectEmailAddressID, t0.Grade, t0.ID,
t0.ModificationDate, t0.ModifiedBy,
t0.ModifiedByMethod, t0.NumBugsSubmitted,
t0.NumDiscussionEntries, t0.NumIssuesSubmitted,
t0.NumSurveysCompleted,
t0.NumSurveysRequested, t0.ParticipantEndDate,
t0.ParticipantID, t0.ParticipantStartDate, t0.ProjectID,
t0.RanWizard, t0.Status FROM ParticipantProjects t0
WHERE t0.ID = 9145
```

Some SQL

```
SELECT t0.AgeRange, t0.Comments, t0.Company,
t0.CreatedBy, t0.CreatedByMethod, t0.CreationDate,
t0.PrimaryTestingEnvironment, t0.FileMakerID,
t0.FirstName, t0.Gender, t0.ID, t0.JobTitle,
t0.LastName, t0.MiddleInitial, t0.ModificationDate,
t0.ModifiedBy, t0.ModifiedByMethod,
t0.NDADateSigned, t0.NDAVersion, t0.NickName,
t0.Occupation, t0.ParticipantGrade,
t0.ProgramStatus, t0.Salutation,
t0.SelectionJustification FROM Participants t0
WHERE t0.ID = 9145
```

Some SQL

```
SELECT t0.CreatedBy, t0.CreatedByMethod,
t0.CreationDate, t0.EmailDescription,
t0.EmailAddress, t0.ID, t0.IsDefault,
t0.EmailAddressIsInvalid, t0.ModificationDate,
t0.ModifiedBy, t0.ModifiedByMethod, t0.ParticipantID
FROM ParticipantEmailAddresses t0 WHERE
t0.ParticipantID = 1516
```

Or a Key Path

- Attach a user interface element

  project.employee.emailAddress.email

Demo

Genevieve Purugganan
WebObjects Engineering

Desktop Database Applications

A user interface challenge beyond the web

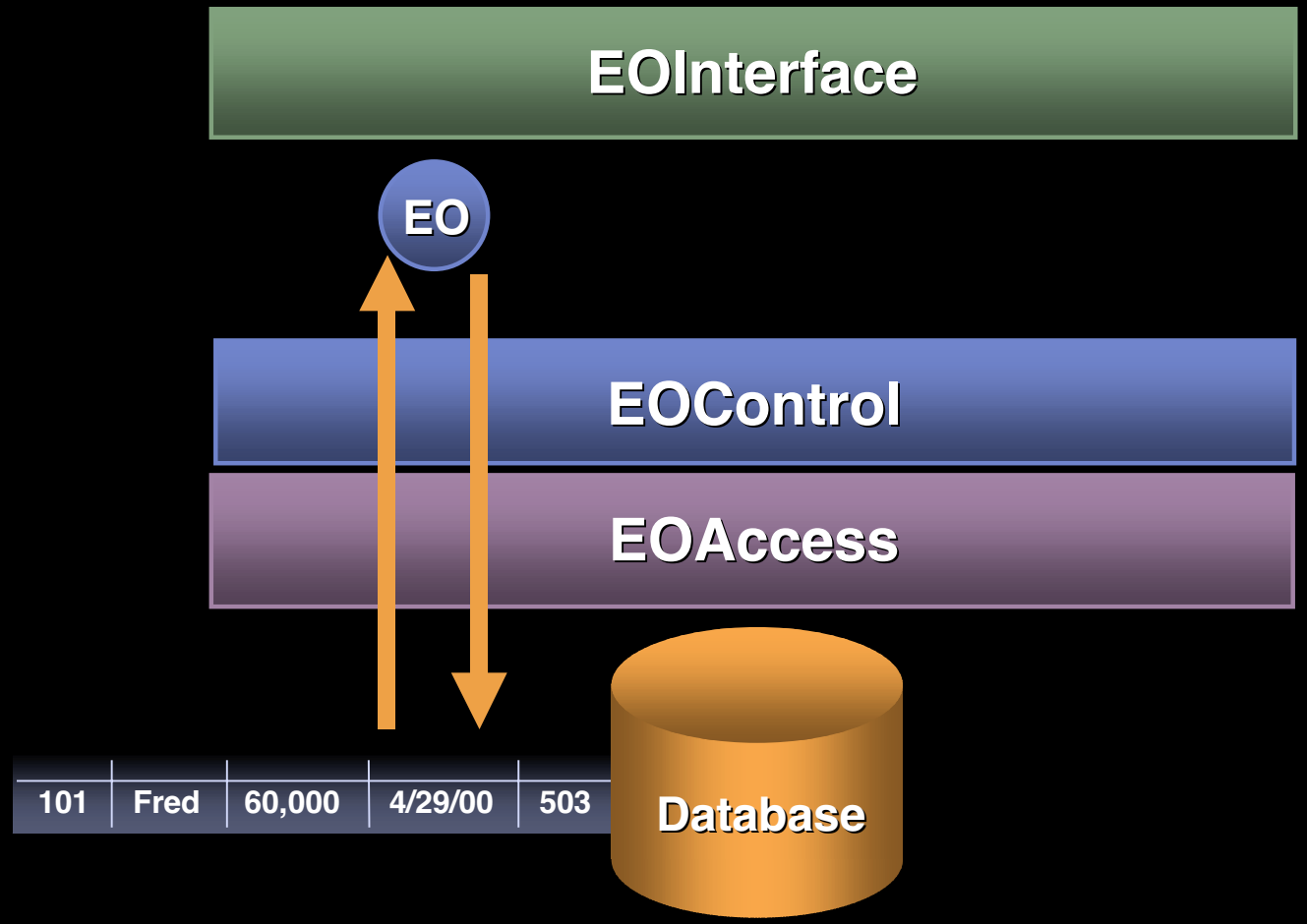
- Event driven applications demand a more dynamic interface than the web
- In Model-View-Controller design pattern, much controller code is synching view to model
- EOInterface abstracts much of this controller work

Demo

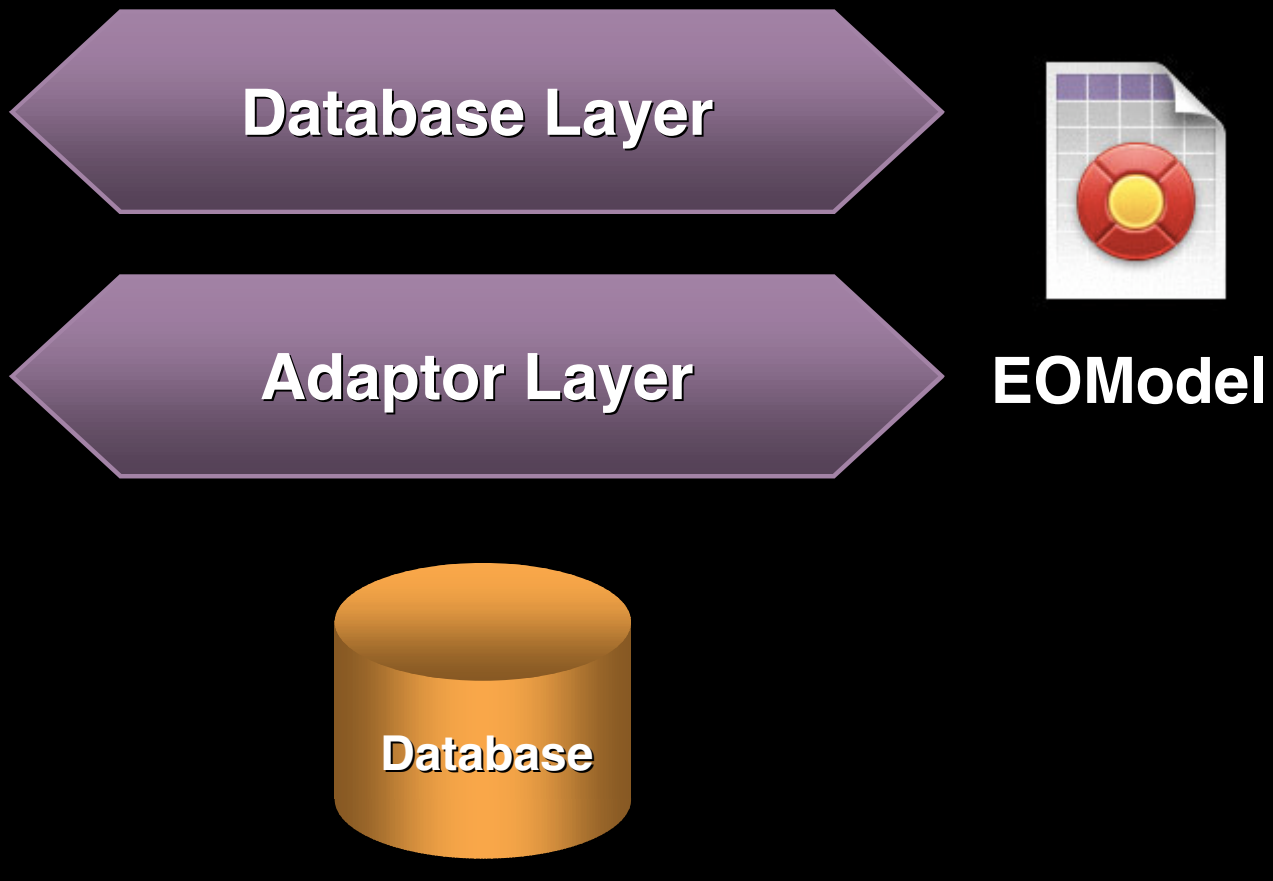
Genevieve Purugganan
WebObjects Engineering

The EOF Stack

Who are the frameworks in your neighborhood?

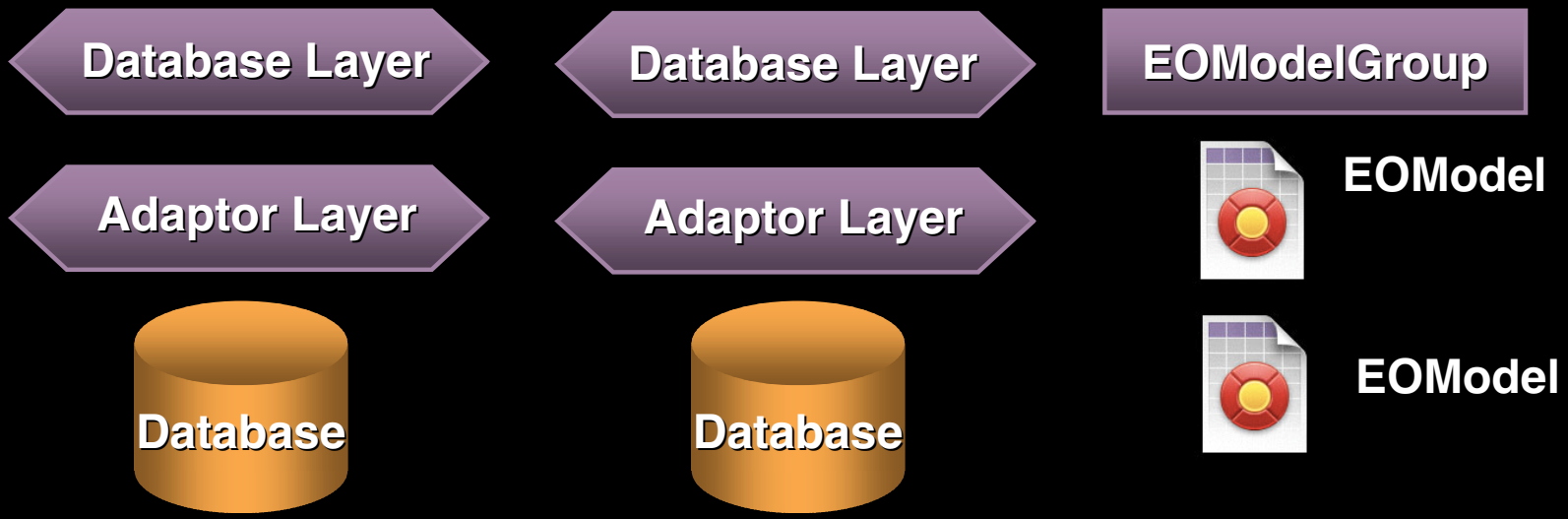


EOAccess Framework



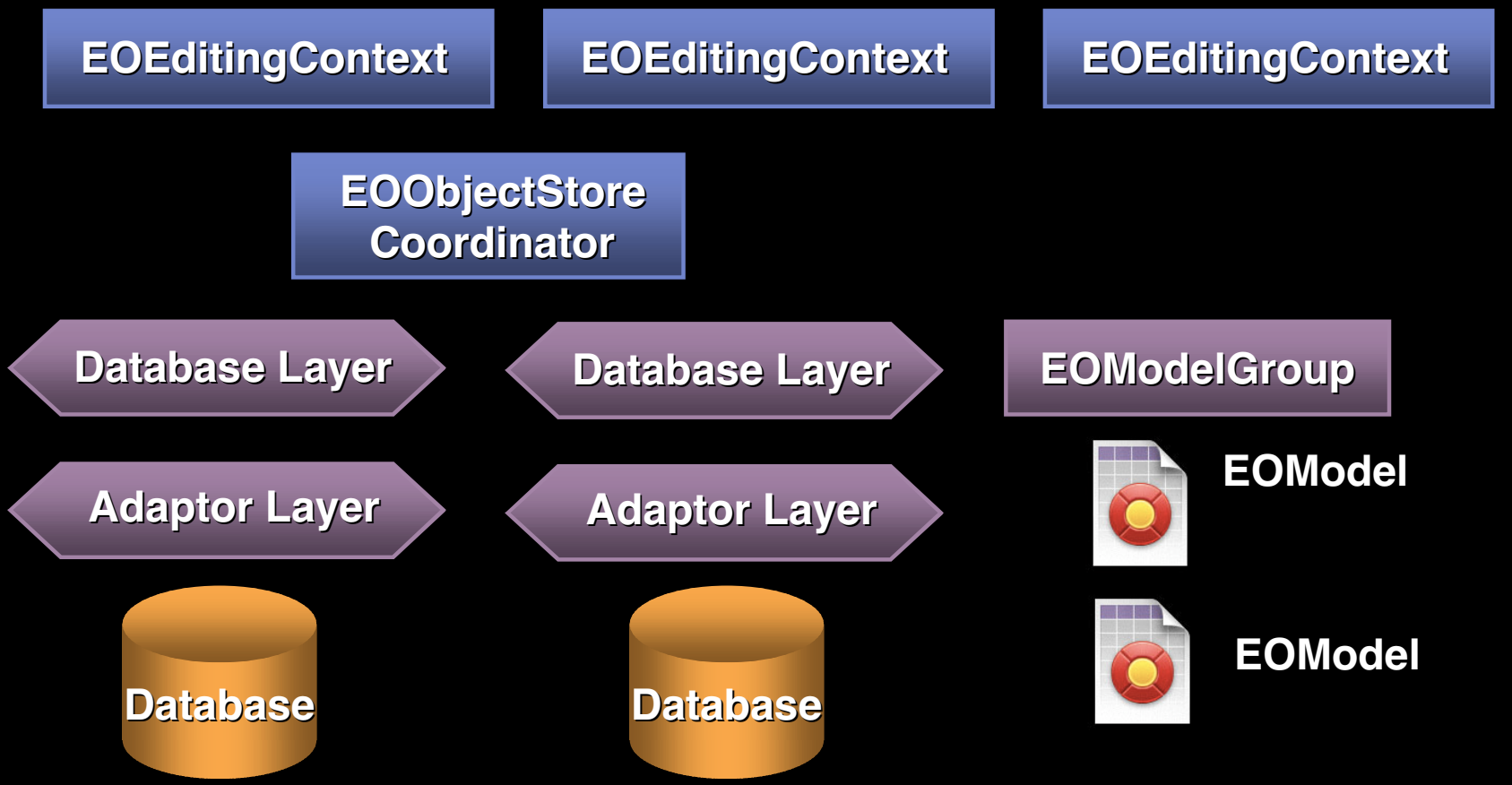
Multiple Data Sources

Multiple EOModels, one per data source

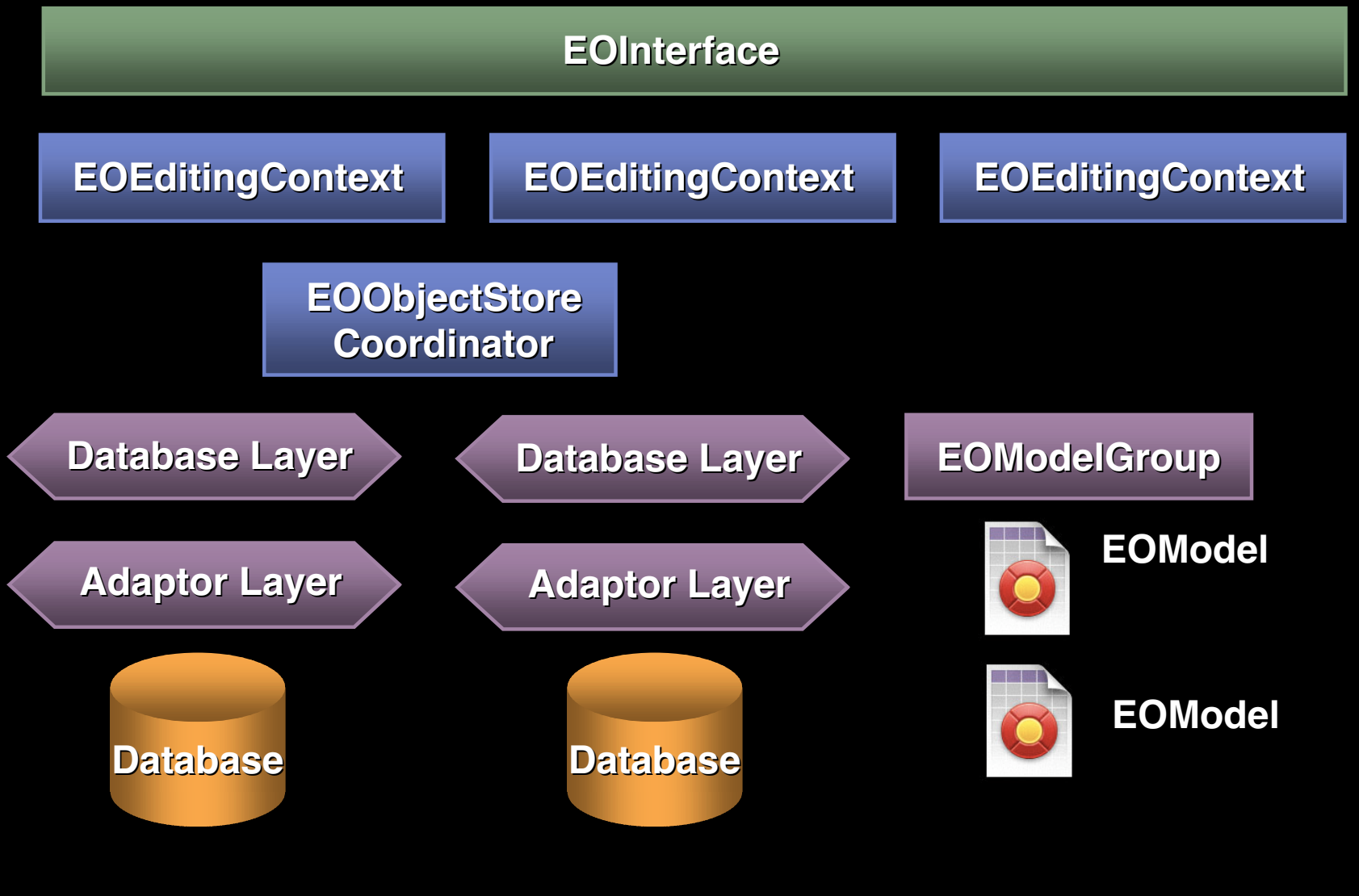


EOControl Framework

EOAccess coordination and programming control



EOInterface Framework



Review

WebObjects Lab

- Located downstairs in Room L
- Lab hours
  - Monday 12:00pm–6:00pm
  - Tuesday 9:00am–2:00pm*
  - Wednesday 9:00am–6:00pm
  - Thursday 9:00am–6:00pm
  - Friday 9:00am–6:00pm

*Conversion Workshop Tuesday 2-6pm; Sign up in Lab

Roadmap

711 Advanced Data Modeling and Connectivity	Room A1 **Thurs., 3:30pm**
712 Advanced Enterprise Objects Frameworks	Room A1 **Thurs., 5:00pm**
714 Optimizing WebObjects Applications	Room A1 **Fri., 10:30am**

Who to Contact

Toni Trujillo Vian
Director, WebObjects Engineering
webobjects@apple.com

Bob Fraser
WebObjects Product Manager
webobjects@apple.com

Services Consulting, Integration, Training and Certification
(800) 848-6398
services@apple.com

http://developer.apple.com/wwdc2002/urls.html

For More Information

- WebObjects Developer Documentation
  http://developer.apple.com/techpubs/webobjects
- Apple Professional Services Technical Support
  (www.apple.com/services/technicalsupport)
- Other places
  - **www.apple.com/webobjects**
  - **developer.apple.com/webobjects**
  - **www.apple.com/services**
  - **www.info.apple.com/webobjects**

  Subscribe to:
  webobjects-announce@apple.com

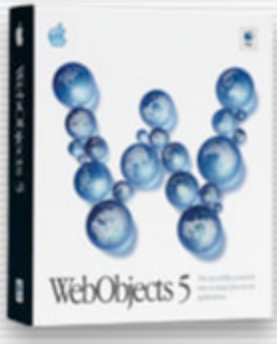
Documentation

Enterprise Objects Framework Develop's Guide

How to Access Documentation

- Most up-to-date: PDF and HTML
  http://developer.apple.com/techpubs/webobjects
- Hardcopy print-on-demand
  Vervante.com under Related Resources
- Product CD
  Documents folder and installed in /Developer/Documentation/WebObjects
- In the box (localized)
  Installation Guides, What's New, WebObjects Overview, Java Client Desktop Applications, Discovering WebObjects for HTML
- Check ADC News for latest updates
  http://developer.apple.com/devnews

Q&A



Toni Trujillo Vian
Director, WebObjects Engineering
webobjects@apple.com

http://developer.apple.com/wwdc2002/urls.html


WWDC2002


WWDC2002


WWDC2002